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ABSTRACT

Although the diagnostic testing of writing is still quite primitive, error analysis and protocol analysis hold promise for writing diagnosis. True diagnostic testing does more than aid in placing students; it identifies the nature of needed instruction. Tests in writing have not been developed to reflect approaches used in diagnostic testing in other areas. Reviews of existing standardized writing tests suggest shortcomings in all three categories of tests identified: objective tests, objective tests corresponding to individualized writing sequences, and essay tests. Information about error analysis, one of the areas that holds promise for writing diagnosis, has been drawn from teachers of English as a second language, who have moved from corrective error analysis to contrastive analysis and finally to the analysis of errors as clues to inner processes. The other promising area, protocol analysis, involves analyzing subjects' oral descriptions of everything they think while performing a task, as a means of identifying inner processes and obstacles encountered. An examination of the writing protocol of a subject in an experimental study reveals the process through which a writer understands a topic. Although protocols are incomplete representations of inner processes, they provide far more information about writing processes than does simply examining the writing outcome. (The paper includes 27 lines of the writing protocol discussed and a chart showing various approaches to error analysis.) (GT)

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Diagnosis in Writing

The current interest in improving instruction and students' writing skills has caused teachers to look for some new approaches for diagnosing writing problems. However, when they have gone to the research or to other practitioners to determine what, if anything, has been done to refine or improve diagnostic techniques and instruments, they have found the field to be in disarray. For example, in a recent survey of forty-four institutions in New York conducted to determine what diagnostic or prescriptive tests were being used, more than thirty different tests were identified by the institutions, with seventeen of the forty-four citing their own inhouse tests.[1]

When educators use the term "diagnosis", the word most frequently is associated with testing, usually objective or standardized testing. Some confusion, however, exists about the difference between diagnosis and placement. Most of the commercial tests presently available make claims for their diagnostic potential but closer examination reveals that they have only predictive validity; that is, the results of these tests may be used to make broad generalizations about students' abilities to write. As a result, students may be placed somewhat accurately in broad groupings or skill levels. Nevertheless, placing a student in a curriculum does not necessarily specify the methods of instruction that should be used with that student nor does it identify specific problems that some student may be having in any one of numerous areas of writing. True diagnostic testing, on the other hand, should

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give information that will identify the nature of the instruction to be used and the specific items or areas that need attention. Diagnostic decisions answer the basic question of what learning activities will best adapt to a learner's individual requirements and thus substantially enhance the student's attainment of a chosen goal.

The art of diagnostic testing is not well developed in many fields, but its lack of sophistication in the field of writing is most noticeable. Psychologists and test measurement experts involved with diagnostic testing commonly identify two directions for experimentation.[2] Through this approach attempts are made to discover specific student characteristics that interact with methods of instruction in such a way that it would be possible to assign different students to different methods of instruction to learn the same thing. Although such an approach seems to make good sense, no tests have yet been devised that will accomplish this goal successfully.

The second approach in diagnostic testing is to do a "fine-grain analysis of an individual student's performance domain."[3] Here the focus is upon discovering what microscopic prerequisite skills are strong or weak and what misinformation or inappropriate associations may interfere with learning activities. Tests have been designed for this purpose and are commercially available, but only in areas such as mathematics, science, and reading, not writing.

A number of reviews of existing standardized writing tests have been done and all suggest the shortcomings of existing tests.[4] One of these reviews, a study done for the San Mateo County Community College District in California, identified three categories of tests and found substantial limitations in all three.[5] For example, standardized objective tests such as the College English Placement Test (Houghton Mifflin 1969), the Purdue High School English Test (Houghton Mifflin 1963) and the McGraw-Hill Comprehensive Test of Basic Skills (1970)

lack diagnostic usefulness for two reasons. First, publishers do not group items testing specific skills so that a score reflecting the strengths or weaknesses of a student in a specific skill can be reported. A second flaw in these tests is that too few items on particular aspects are included to provide reliable diagnostic information. Only one test, (the Descriptive Tests of Language Skills DTLS) by Educational Testing Service introduced in the fall of 1977 seems to at least partially answer the previous objections. The DTLS consists of five multiple-choice tests: Reading Comprehension, Vocabulary, Sentence Structure, Logical Relationships, and Usage. The tests are advertised as being useful for diagnosing students' strengths and weaknesses and do provide more of a break-down of the individual skills being tested than any of the other existing tests. Additional tests may be developed if these prove useful.

In a second category, it was found that objective tests to diagnose specific weaknesses corresponding to textbook or programmed individualized sequences of concepts and writing assignments do have diagnostic capabilities; but these tests are limited to the skills in the sequences and tend to be, as do almost all writing tests, mainly focused on grammatical and mechanical items.

A third category, that of essay tests, showed slightly more promise. Where attempts have been made to develop a curriculum based criteria for use with such tests, the instruments do measure both creative and mechanical aspects of writing. Once again, however, the reporting methods for most of these essay tests do not include means for giving specific reports on grammar or mechanics and even the information on rhetorical strategies is somewhat generalized.

What all of this reveals, of course, is that the state of the art

in diagnostic testing, as far as writing is concerned, is still quite primitive. We have to realize that the end purpose of diagnostic testing should be not to screen out prospective students but to match the available resources of the school to the strengths and weaknesses of the student. Errors in learning are often in need of interpretation in light of the particular instructional program in which they occur. In some programs, a highly proficient level of performance may be required in order for a student to continue. In other programs, instruction is designed so that it is spiral in nature. When this occurs, it is often necessary to have only a minimal level of proficiency in order to proceed to new instruction because the concept or skill to be learned will be taught again and integrated into more advanced learning. To some degree, this spiral theory of instruction could be related to writing, since the basic rhetorical forms are repeated at a number of grade levels and hence call for on-going reinforcement and review.

Because diagnostic testing, in the traditional sense, does not at the present time offer a great deal of help to the writing instructor, we must look for other ways for identifying the significance of students' strengths and weaknesses. Two areas seem to hold promise for diagnosis in writing: error analysis and protocol analysis.

Information about error analysis has been drawn from those who teach English as a second language;[6] these people have been engaged for some time in a study of students' speaking and writing errors, and much of what is used in ESL teaching seems to be applicable to the teaching of writing.[7] Those involved in ESL teaching, though, have gone through

several changes of attitude in arriving at their present view of errors. One should have no difficulty discerning parallels among these attitudes and similar ones held by writing teachers. At first, the ESL expert focused on corrective analysis. All errors were equally bad and the learner was obviously in a sad state. Some teachers even kept lists of recurring errors but little attempt was made to see any patterns to these errors or to seek causes for them. Instead, the errors were identified, labeled as bad, and the student warned not to repeat them--an approach somewhat analogous to the "bleeding pen" syndrome of some composition teachers.

Then ESL teachers began to see that systems existed in the languages and thus teachers became interested in seeing if a pattern of errors emerged when the student's native language and the second language collided in a learning situation. The systematic nature of a learner's errors was predicted and/or explained by what was called the contrastive analysis hypothesis: students will err in the second language when it differs from the first language. For example, a Vietnamese student might say "he writes fas" instead of "he writes fast." because no consonant clusters exist in Vietnamese. This view corresponds to the theory about dialect interference in native American speakers, which gave rise to the emphasis on pattern drills to make students bi-dialectal. The dialect interference view remains a popular explanation of why speakers of minority dialects make many errors in writing. However, the contrastive analysis approach has led to more tolerance of error, helping us recognize that many errors may be surface ones and not indicators of a cognitive disability or severe cultural deprivation.

ESL teachers have now begun to move to a third view of their students' problems in speech and writing; errors are looked at in much the same way that reading researchers now view miscues in

reading--as clues to inner processes that lead to language use. To give an idea of how the first two approaches differ from this third one, consider how each would treat the following passage:

> Marsha, ninety pound lighter, is a lifetime Weight Watcher now. Watching television, she no longer eat potato chips.

Although the writer of this passage omits the final "s" on "pound" as well as on the verb "eat," let us concentrate on the verb error. The corrective analyst would circle the error in red, explain how terrible the error is to the student and tell the writer not to do it again. The contrastive analyst would explain to himself that the error was the result of language interference and would contrast the two languages to check the hypothesis. The error analyst might see the error as an interference problem but that would not be interpreted as meaning the writer is locked into the habits of the first language. In the eyes of the error analyst, it is evident that the student tried to deal with verbs as they are handled in the native dialect; the student erred but at least a strategy was used. If the teacher reacts by looking for several possible causes of the error and then devises a strategy for overcoming those influences, the student can learn the new strategy and avoid drilling on a single item.

Errors, then, have become more than targets for the red pen or the percentile rank. They . . offer clues to the linguistic and cognitive processes occurring in students' minds. One of the primary implications of error analysis research is that since many errors arise from multiple causes, they are likely to disappear only if teachers guide students to see all the different routes that led them to the error. Mina Shaughnessy, whose work in error analysis has helped us to become aware of its possibilities, suggests the following perspective:

> Part of the task of helping ... students master the formal verb system therefore depends upon being able to trace the line of reasoning that has led to erroneous choices rather than unloading upon the student's memory an indifferent bulk of information about verbs, only part of which relates to his difficulties.[6]

Or, as one student wrote after completing a course that had concentrated exclusively on grammar, "We done all the conjugations of the verbs for a semester, but I haven't did any writing yet." The various approaches to error analysis are summarized in the chart below.

Approaches to Learners' Errors[7]

Issue	Product Approach	Process Approach
Why should one study errors?	To produce a linguistic taxonomy of <u>what</u> errors learners make	To produce a psycho-linguistic explanation of <u>why</u> a learner makes an error
What is the attitude toward error?	Errors are "bad." (Interesting only to the linguistic theorist)	Errors are "good." (Interesting to the theorist and teacher and useful to the learner as active tests of his hypotheses)
What should we do about errors?	Attack the individual errors and eliminate them through drill to produce overlearning	Understand the source of errors: the rule-based system that produces non-standard forms; provide data for new rule formation
What can we hope to discover from learners' errors?	The source of failure: those items on which the learner or the program failed	The strategies which led the learner into the error (learner's language is a system)
How can we account for the fact that a learner makes an error?	It is principally a failure to learn the correct form (perhaps a case of language interference)	Errors are a natural part of learning a language; they arise from learners' active strategies: over-generalization, ignorance of rule restrictions, incomplete rule application, hypothesizing false concepts
What are the emphases and goals of instruction?	A teaching perspective: eliminate all errors by establishing correct, automatic habits; mastery of the Target Language is the goal	A learning perspective: assist the learner in approximating the Target Language, support his active learning strategies and recognize that not all errors will disappear

Another area which seems to hold promise for those looking for diagnostic approaches is that of protocol analysis. A protocol is a description of the activities, ordered in time, in which a subject engages while performing a task. This approach holds promise because there has been little systematic direct observation of fluent writers at work and even less of those writers who are not fluent.[8] Cognitive psychologists developed the technique of protocol analysis as a tool for identifying various psychological processes. Most typically, protocols have been used to identify processes in problem solving. But although a protocol is a description, not every description of a task performed is a protocol. For example, consider the statement "My daughter convinced her father to give her the car keys." Such a statement implies that the daughter did something but it does not say what or in what order. Here is a possible protocol of that situation:

Father (seated in easy chair, reading evening paper)

Daughter (enters room and walks up behind father's chair and stands quietly behind it)

Father (turns page of newspaper)

Daughter (leans over and places arms on father's shoulders; nuzzles his left ear) "Dad, are you going out tonight?"

Father (pauses in reading) "No, why?" (raises head slightly)

Daughter (snuggling closer to father) "Well, I have to go to cheerleading practice and I know you don't want to have to take me and then wait for me to get through."

Father (placing paper in lap and trying to see daughter's face) "Why not?"

Daughter (coming around to perch on arm of chair) "Well, because we may have a long practice and you could be watching Monday night football--the Steelers and Cowboys are playing."

Father (reaching for TV Guide) "Is that right?" (finds announcement in magazine) "Hmm, you're right; okay, you can take the car but be sure to get in by 11."

Daughter (leaning over and kissing her father on cheek)"Thanks, dad, you're okay."

In protocol analysis, then, we are interested not only in what a person says but also in the sequence of things they do to get to a solution.

"Thinking aloud" protocol subjects are asked to say aloud everything they think while performing the task. They are asked to say everything that occurs to them, no matter how trivial it may seem. Even with such explicit instructions, subjects occasionally forget and lapse into silence, completely absorbed in their task. At such times the analyst has to say, "Remember, tell me everything you are thinking." After obtaining a protocol, we analyze it in an attempt to identify the psychological processes and the obstacles which a subject encountered while performing a task.

The excerpt below provides the first twenty-seven lines of a writing protocol (about 10% of the entire protocol) drawn from the experimental study of Professors John R. Hayes and Linda S. Flower at Carnegie-Mellon University.[4] The writer of the protocol was a volunteer who knew that she was to be involved in a writing study for about an hour. She also knew that she would have to "think aloud" as she produced a short essay. She did not know the topic, however, until arriving for the taping of the session.

(See next page for the protocol)

There are several aspects of this protocol which might be addressed but for purposes of explanation, let us consider only one, the process of understanding a topic. Evidence that understanding processes are at work may be seen as the writing proceeds. For example, lines 1-3 show the writer identifying motivation with grades; then in lines 6-7, she introduces the idea of personal satisfaction but is not certain that this is a source of satisfaction separate from grades. Lines 8-12 show personal satisfaction being assigned a prominent role, but it is

Writing Protocol

W: Ok, um, the issue is motivation and the problem of writing papers. For me, motivation here at Carnegie-Mellon is the academic pressure and grades that are involved, so I'd better put that down. ..and grades... Um, they kind of compel me, that's really what motivation is, um, kind of to impel or start or a, momentum. (Pause.) Ok, I suppose from the academic pressure of the grades, I'm not sure whether, I think personal satisfaction is important, but I'm not sure whether that stems from academic pressures and grades, or whether-- I would say personal satisfaction is a major issue. Ok, um. Oh.

L: What are you thinking?

W: I'm trying to think of the first sentence to start with. Um, maybe something like, personal satisfaction is the major motivating force in the writing of my papers and reports. Ok, I'm trying to think of; ok, I want to somehow get it into the academic pressures now. Um, well maybe not so soon. Ok. Not only do I get satisfaction from my grades, but I also get satisfaction in turning in something that is good quality. So, if I'm happy when I write a good paper, it really doesn't matter what kind of grade I get back on it, if I'm happy with it. So, um, um, let's see. Um, what are the-- I'm thinking of, I'm trying to relate personal satisfaction between academic pressure and the grades, but I'm not really sure how to do it, how to branch it. I'm really having a hard time getting started. Well, maybe I'll just write a bunch of ideas down, and maybe try to connect them afte I finish. Ok. When I feel that I've written a high quality, and I put in parentheses, professional, paper, um. to be graded, when I submit it, the grade is not always necessary for the teacher to have the same. Ok, that's kind of_____ _____; I'll check with that one. Ok, and-- Let's see what else. Um, but (a)course, the reason I'm writing the paper in the first place is for that grade, or to relate that back. Those two ideas are very interlocked--maybe that's not the right term.

not clear how the writer relates it to grades. Lines 13-15 offer two sources of personal satisfaction: grades and the production of high quality work. The two sources of satisfaction are related in lines 15 and 16 and again in lines 21-23. The basic relationship is that if the work is of good quality, a grade is not necessary for satisfaction. A contradictory relationship emerges in lines 24 and 25; here she notes that grades are the initial motivator for all essay writing. Then in lines 26-27, these relationships are described as "interlocked," not contradictory. This contradiction is realized later in the protocol and in large measure, the final essay, given below, focuses on the resolution of this conflict.

> Personal satisfaction is the major motivating force in the writing of my papers and reports. The emphasis on 4.0's at CMU causes grades to become an instinctive motivator for myself. Acquiring good grades does, in fact, give me personal satisfaction.
>
> The initial motivator in the outset of writing a paper is the fact that a grade will be attached to it upon completion. I feel that my role as a student requires all of my efforts to be put forth into course work, which includes the writing of papers.
>
> After I begin writing a paper, the grade emphasis diminishes and a higher level of personal satisfaction takes over. When I feel that I've written a high-quality or professional paper to be submitted for grading, it is not mandatory for the teacher to have the same opinion. But of course, this somewhat contradicts my earlier statement that the motivation for writing a paper is to achieve the ultimate goal--a good grade.
>
> Thus, the combination of the grade "initiator" and later a higher level of personal satisfaction is what motivates me to write college papers and reports.

In this protocol we glimpse the process of understanding a topic and the problems involved in that process. Analysis of several protocols in which students perform the same task can give us insights into how students address a topic and, in turn, we can identify particular approaches that may help them become more adept in using such processes. Therefore, protocol analysis becomes an aid in diagnosing

performance in a wide variety of tasks. Typically, though, protocols are incomplete. Many processes occur during the performance of a task which the subject can't or doesn't report. The teacher's task in analyzing the protocol is, of course, to take the incomplete report together with knowledge of the writer's capabilities and the writing process, to infer the underlying processes or lack of them by which the student performs the task. The power of protocol analysis lies in the richness of the data. Even though protocols are incomplete, they provide us with far more information about processes by which writing tasks are performed than if we simply examined the outcome.

Because truly adaptive and personalized instruction in writing calls for diagnosis of student learning difficulties on a continuing basis, most of the diagnostic instruments available to us are not sufficient in and of themselves. Objective tests do little more than look at error identification; they do not address process and they do not provide sufficient discrimination about the relative weight of items to make the results useful to the classroom teacher. As a result, diagnosis of student writing must look to such promising fields as error analysis and protocol analysis to yield important insights which can be translated into classroom strategies and learning activities.

Notes

1. Stephen Adolphur, "Diagnostic Testing and the Disadvantaged Student: A Field in Disarray," paper presented at the Annual Conference on Remedial/Developmental Studies in Postsecondary Education, Chicago, March 1977 (ERIC 140 281).

2. See Anthony J. Nitko, "Assessing Students for Prescriptive and Placement Purposes," paper presented at 61st annual Education Conference, Iowa City, Iowa, December 1976 (ERIC 152 785).

3. Ibid.

4. See, for example, Reviews of Selected Published Tests in English, ed. Alfred H. Grommon and others. Urbana, Illinois: NCTE, 1976.

5. "Analysis of English Placement Examinations: A Study," San Mateo County Community College District Basic Skills Project, San Mateo, California, January 1978 (ERIC 148 424).

6. Jack C. Richards, ed. Error Analysis: Perspectives on Second Language Acquisition (London: Longman, 1974).

7. Barry M. Kroll and John C. Schaefer, "The Development of Error Analysis and its Implications for the Teaching of Composition," paper presented at Conference on College Composition and Communication, Kansas City, Missouri, March 1977 (ERIC 145 482).

8. Errors and Expectations (New York: Oxford University Press, 1977), p. 105.

9. Kroll and Schaefer.

10. See Janet Emig, Composing Processes of Twelfth Graders, (Urbana, Illinois: NCTE, 1971); Terry Mischel "A Case Study of a Twelfth Grader," Research in the Teaching of English (Winter 1974), 303-314 and "An Examination of the Writing Processes of Seven Year Old Children," Research in the Teaching of English (Winter 1975), 227-241.

11. "Protocol Analysis of Writing Processes," paper presented at the annual meeting of the American Educational Research Association, Toronto, Canada, March 1978 (ERIC 155 697).